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Original Research Article

COMPARATIVE STUDY OF ROLE OF WOUND OUTCOME IN VACUUM ASSISTED CLOSURE OF WOUNDS TO CLASSICAL (MOIST) WOUND CLOSURES

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Abstract

Background & Method: This study is conducted at General Surgery department of Index Medical College Hospital and Research Centre, Indore (M.P.) To Analysis of wound outcome in Vacuum assisted closure of wounds in comparison to classical (moist) wound closure in terms of rate of granulation tissue formation, culture at presentation, complications and recommendations. The wound of the patient was assessed by measuring the maximum length and maximum width of the wound. Then on day 7th, 14th and day 21st, the maximum length and maximum width of the granulation tissue covering the same wound was measured.

Result: In Group I Mean age of patients is 39 ± 13 years and in Group II it is 42 ± 14 years. In Group I and Group II there is no difference in the gender wise distribution. The most common disease in both the groups I and II is bed sore followed by compound fractures. The most common organism on culture in group I is S. aureus (9) followed by polymicrobial growth (7), and in group II is S. aureus (10) followed by E.coli (7). The average rate of granulation in group I on day 7th is 27.63 ± 23.23, on day 14th it increased to 35.92 ± 25.75, and on day 21st it further increased to 65.6 ± 15.20. The average rate of granulation in group II on day 7th is 31.34 ± 18.22, on day 14th it is increased to 57.4 ± 17.55, and on day 21st it further increased to 75.16 ± 6.732. Group I had higher number of complications (8) in comparison to group II (6). There is no complication in 44 patients of group II and 42 patients of group I.

Conclusion: In our present study it was concluded that the rate of granulation tissue formation was better in the VAC group in comparison to the conventional dressing group. Vacuum assisted closure dressing was found to be totally safe, although technically demanding. Thus, we conclude that the surgeon's discretion is very much needed in VAC being the choice of dressings in certain wounds and where there is much difficulty in performing VAC dressings, the conventional dressings should be the choice.

Keywords: wound, vacuum, moist & outcome.

Introduction:

Wounds are regarded as chronic when they fail to heal or do not respond to treatment. In an attempt to influence this wound healing process many kinds of treatment have been developed, for example surgical debridement, various types of dressings, topical applications, and antiseptic agents [1].

One of the recent developments is the application of vacuum assisted closure (VAC). The vacuum-assisted closure was pioneered by Dr Louis Argenta and Dr Michael Morykwas in 1993. Vacuum-assisted closure (VAC) therapy, which has been developed as an alternative to the standard forms of wound management, incorporates the use of negative pressure to optimize conditions for wound healing[2].

The technique generally entails putting a dressing into the wound cavity, connecting the dressing to a vacuum pump, and sealing the area with an adhesive film[3]. The tube is connected to a vacuum device that delivers a controlled negative (i.e., suction) pressure in the range of -50 mm Hg to -125 mm Hg.

In VAC therapy, the application of topical negative pressure (vacuum) reduces infection rates (closed/sealed system creates a hypoxic environment and sucks out bacteria and debris therefore reduces colony count), removes blood and serous fluid and slough and controlled debridement and increases localized blood flow[4].
Research has shown a maximum increase in blood flow at a negative pressure of 125 mm Hg, which is therefore the advised amount of negative pressure. It supplies the wound with oxygen and nutrition to promote granulation and hence accelerate the healing wound surface area.

Aims and Objectives:

Analysis of wound outcome in Vacuum assisted closure of wounds in comparison to classical (moist) wound closure in terms of rate of granulation tissue formation, culture at presentation, complications and recommendations.

Material & Method

This study is conducted at General Surgery department of Index Medical College Hospital and Research Centre, Indore (M.P.), from July2019 to December2020.

Patient inclusion criteria - 100 patients irrespective of age and sex with wounds was included in the present study.

Exclusion criteria

- Pregnancy
- Unfavorable chronic and cardiovascular status
- Bleeding disorders
- Malignancy

Patients was assigned to either group randomly, irrespective of wound types, gender, caste, creed, etc.

Group I: Standard (Moist) Dressing (50 patients). Total of 50 cases satisfying inclusion criteria was included in the study and standard (moist) technique was applied over the wounds.

Group II: VAC Dressing (50 patients). Total of 50 cases satisfying inclusion criteria was included in the study and vacuum assisted closure technique was applied over the wounds.

Assessment of rate of granulation

At presentation, the wound of the patient was assessed by measuring the maximum length and maximum width of the wound. Then on day 7th, 14th and day 21st, the maximum length and maximum width of the granulation tissue covering the same wound was measured.

The length of granulation tissue (a) multiplied by breadth of granulation tissue (b) divided by length of wound (c) multiplied by breadth of wound (d) and whole multiplied by 100. This gives the rate of granulation tissue in percentage.

STATISTICAL ANALYSIS

For the present study, student's 't' test was used to calculate the difference of means of both the groups. The value of 't' was matched from the table and then p value was obtained. A p-value of < 0.05 was considered as significant and p value > 0.05 was considered as not significant. The confidence interval of 95% was taken for analysis.

ETHICAL CONSIDERATIONS

The present study synopsis was submitted to the Scientific Review Committee and Ethics Committee of Index Medical College, Hospital & Research Centre, Indore, for their review and approval. The present study was approved by both the committees to be conducted in the institution in the present form.

Results

Table 1: Mean Age of the Patients in Both the Groups

Group	Mean Age	± SD
Group I	39	13
Group II	42	14

In Group I Mean age of patients is 39 ± 13 years and in Group II it is 42 ± 14 years.

Table 2: Gender Wise Distribution of Groups

Gender Wise	Male	Female
Group I	31	19
Group II	31	19

In Group I and Group II there is no difference in the gender wise distribution.

Table 3: Diagnosis Wise Distribution of Groups

Diagnosis	Group I	Group II
Bed Sore	11	11
Burn Wound	4	3
Burst Abdomen	3	2
Compound Fracture	6	6
Degloving Injury	5	3
Diabetic Foot	3	2
Diabetic Ulcer	2	3
Traumatic ulcer	-	2

Diagnosis	Group I	Group II
Electrical Burn Wound	2	1
Foot Ulcer	1	-
Gaping Wound	2	4
Neuropathic Ulcer	3	4
Non Healing Wound	4	5
Wound Dehiscence	4	3

The most common disease in both the groups I and II is bed sore followed by compound fractures.

Table 4: Organism Wise Distribution in Both the Groups

Organism	Group I	Group II
Klebsiella	2	-
E. coli	5	7
S. aureus	9	10
Polymicrobial growth	7	5
Pseudomonas	4	4
Streptococcus + Acinetobacter	2	1
No growth	10	9

The most common organism on culture in group I is S. aureus (9) followed by polymicrobial growth (7), and in group II is S. aureus (10) followed by E.coli (7).

Table 5(a): Rate of Granulation in Group I

Rate of Granulation	Group I		
	7^{th} Day	14^{th} Day	21^{st} Day
< 20 %	25	17	-
20 – 40 %	18	19	-
40 – 60 %	-	3	20
60 – 80 %	-	-	7
Definitive surgical procedure performed (>80% granulation)	7	11	23
Total	50	50	50
Group I	at 7th day	at 14th day	at 21st day
Mean	27.36	35.92	65.6
SD	23.23066	25.75936	15.20204

The average rate of granulation in group I on day 7th is 27.63 ± 23.23, on day 14th it increased to 35.92 ± 25.75, and on day 21st it further increased to 65.6 ± 15.20.

Table 5(b): Rate of Granulation in Group II

Rate of Granulation	Group II		
	7^{th} Day	14^{th} Day	21^{st} Day
< 20 %	13	-	-
20 – 40 %	23	9	-
40 – 60 %	11	16	-
60 – 80 %	-	18	22
Definitive surgical procedure performed (>80% granulation)	3	7	28
Total	50	50	50
Group II	at 7th day	at 14th day	at 21st day
Mean	31.34	57.4	75.16
SD	18.22715	17.558067	6.7320737

The average rate of granulation in group II on day 7th is 31.34 ± 18.22, on day 14th it is increased to 57.4 ± 17.55, and on day 21st it further increased to 75.16 ± 6.732.

Table 6: Complication Wise Distribution of Groups

Complications	Group I	Group II
Present	8	6
Absent	42	44
Total	50	50

Group I had higher number of complications (8) in comparison to group II (6). There is no complication in 44 patients of group II and 42 patients of group I.

Discussion

Fleischmann et al in 1993, following the successful use of VAC technique in 15 patients with open fractures reported that the treatment resulted in "efficient cleaning and conditioning of the wound, with marked proliferation of granulation tissue"[5].

Fleischmann et al also described the treatment 313 patients with acute and chronic infections of various types[6]. The average duration of vacuum therapy in the treatment of the 313 patients with infected wounds was 16.7 days with an average of 3.1 dressing changes. Of the 203 wounds with acute infections the majority was subsequently closed by secondary suturing (65.5%) and the remainder by spontaneous epithelialization (17.2%), skin grafting (12.3%) or flap transfer (2%). Six patients (3%) died.

Mullner et al described the results of a prospective trial involving 45 patients with soft tissue injuries including sacral pressure ulcers, acute traumatic soft tissue defects and infected soft tissue defects following rigid stabilization of lower extremity fractures[7]. They reported that in 38/45 patients (84%), the use of the vacuum sealing technique following irrigation and debridement decreased the dimensions of the initial wound, thus facilitating healing time and the eradication of any pre-existing infection[8].

Conclusion

In our present study it was concluded that the rate of granulation tissue formation was better in the VAC group in comparison to the conventional dressing group. Vacuum assisted closure dressing was found to be totally safe, although technically demanding. Thus, we conclude that the surgeon's discretion is very much needed in VAC being the choice of dressings in certain wounds and where there is much difficulty in performing VAC dressings, the conventional dressings should be the choice.

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